AN ORTHOPEDICS CLINIC ASSISTANT SYSTEM

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Abstract - **This research proposed a system, which integrated the complete patient information, including the medical images, for assisting orthopedics clinic diagnosis. The system concurrently operated with legacy systems and conformed itself to correspond with the current environment. It was unnecessary to modify the present systems for our system implementation. The system resulted in minimal impact to the current healthcare institutes, and promoted the communication of medical images among departments. It offered a valuable reference for PACS implementation.**

Keyword - **Data exchange, image communication, clinic assistant**

I. INTRODUCTION

There are many legacy systems concurrently operation in the modern hospital, range over Hospital Information System (HIS), Radiological Information System (RIS), Laboratory Information System (LIS), Physiological Information System (PIS), and Pharmacy Information System. The heterogeneous systems are usually implemented in different time, and are originally designed for department audit and administration, not for clinic services. In the modern, the care mode is very complicated. Department cooperation is the fundamental requirement. The diverse systems result in the inconsistent content definition and the insolvable discrepancies [1-2], which impede the collaborations among different departments. Although many researchers have devoted their efforts in solving the data exchange problems, and achieved fruitful results. But the sharing information is always limited only in text data; the image communication is still not commonly available. This problem is deeply concerned with the orthopedics department since medical images, especially about X-ray films, are the significant tool for orthopedics diagnosis. It's the general case in the orthopedics department; the discomfort or inability patients usually must circulate between the physician office and radiological department for waiting the films, which makes the patient very inconvenient.

This study proposed an Orthopedics Clinic Assistant System (OCAS), which integrated the complete patient information, including the medical images, for assisting orthopedics clinic diagnosis. OCAS was an agency system, which operated along with the legacy systems, and coordinated them for information organization.

II. METHODOLOGY

OCAS was established by the orthopedics clinic workflow. When the patient registered, his/her demography and history were dumped from HIS to OCAS. In the next step, OCAS referred RIS, LIS, and PIS for updated patient's reports. After physician's exploration, the decisions were made whether the patient needs additional examinations or whether it was an emergency case. For the crisis cases, a special request was placed and OCAS would restart the relative information acquisition for physician's further exploration. In general cases, OCAS requested for examination queue. Finally, OCAS placed a medicine order to pharmacy department and updated the information in HIS. The complete flowchart was shown in Fig. 1. The development of OCAS was based on the current environment. It was unnecessary to modify the conventional systems. OCAS was an agency system, which conformed itself to the ways of present information systems.

All deployed computers for the system were personal computers. The graphic operation systems, MS-WINDOWS 2000, were adopted for their friendliness and generalization. The database engine was MS SQL server 7.0, which was a relational engine and provided effective data linkage, sorting, and combination. The vender-independent query language Consequent SQL was deployed, which was compatible with all database engines.

OCAS was concomitantly operating with the legacy systems. Since the data inconsistent, a commercial software Attachmate Extra! [3] was applied. The software created sessions for retrieve the information on the legacy terminals, and resolved the

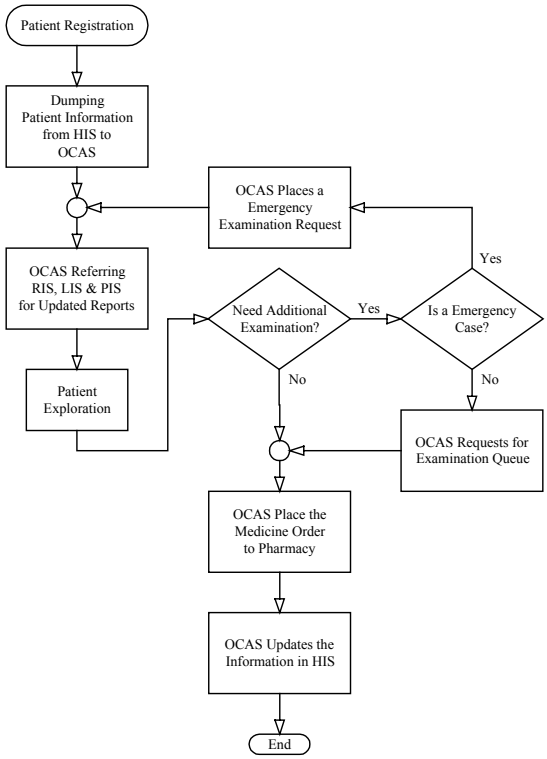

Fig. 1. The system flowchart

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discrepancy problems. The sessions for connecting legacy systems were modularized and independent to each other. More additional information sources can be included even with some discrepancies. The system can be easily expanded without kernel modification, and it demonstrates the flexibility and scalability.

The image application was developed in LabView 5.0. The medical images with DICOM 3.0 format were acquired from radiological department, and then the decoding process was progressed. Finally the heading of DICOM file was kept for reference, and the original image was reconstructed [4].

III. Results

OCAS was connected with conventional hospital intranet with a 100M Fast Ethernet backbone. The current backbone was sufficient for text transporting. For image delivery, an additional backbone of Gigabit Ethernet was set up. The Gigabit backbone connected OCAS, radiological image sources, and outpatient department. The system configuration was shown in Fig. 2. There were two monitors deployed in the outpatient room for information presentation. One high-resolution general-purpose monitor was for reviewing the text data and image miniatures. The interested image was selected by the image miniature, and then presented on the other high-definition portrait grayscale monitor. The monitor deployment was shown in Fig. 3.

After the patient registration, the basic patient's information was dumped into OCAS, and then OCAS queried the updated relative reports from other departmental systems and retrieved latest medical images. Finally OCAS integrated the complete patient's information and concluded the patient list to outpatient department. The physician selected an individual patient from the patient list, reviewed the history and relative information, and was well prepared before the patient arrived. If the additional examinations were necessary, the request was sent to relevant department directly, and the department will coordinate the examination time. Consequently the reports or images would be back in specified time. The patient didn't need to waste time around department circulation. After the patient's visiting, OCAS updated the information in HIS and kept a copy for future usage.

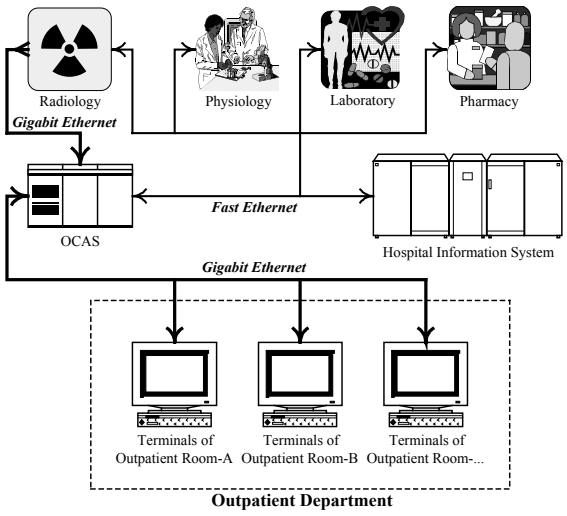

Fig. 2. The system configuration

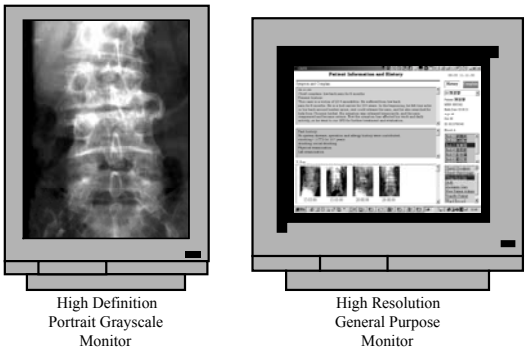

Fig. 3. The monitor arrangements in outpatient room.

IV. Discussions

The proposed system based on the workflow of outpatient visiting to acquired, analyzed and updated patient information from diverse departments. It concluded clear records to provide physicians all accurate, completed and timely information. The end-up effect increased the healthcare efficiency and quality.

OCAS was concurrently operating with legacy systems and conformed itself to correspond with the current environment. It was unnecessary to modify the present systems for OCAS implementation. Since OCAS resulted in the minimal impact to the original healthcare institutes, and promoted itself to be accepted. The development of OCAS eased the communication of medical images, and further facilitated the global implementation of Picture Archives and Communication System (PACS). OCAS always kept a copy of patient relational information and continuously updated it. This arrangement sped up the data integration when patient's re-visiting. Along with the time passing, the capacity of OCAS will increase gradually, and approach to HIS. Finally OCAS maybe replace partial function of HIS, and provide a more friendly data interface.

V. Conclusions

This research proposed a system to assist orthopedics clinic diagnosis. The system integrated the complete patient information to provide physician with quality decisions, and to offer a valuable reference for PACS implementation.

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